General

Title

Coronary artery bypass graft (CABG): hospital 30-day, all cause, unplanned risk-standardized readmission rate (RSRR) following CABG surgery.

Source(s)

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research and Evaluation (CORE). 2017 procedure-specific measures updates and specifications report: hospital-level 30-day risk-standardized readmission measures. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2017 Mar. 80 p.

Measure Domain

Primary Measure Domain

Related Health Care Delivery Measures: Use of Services

Secondary Measure Domain

Does not apply to this measure

Brief Abstract

Description

This measure estimates a hospital-level 30-day risk-standardized readmission rate (RSRR) for patients discharged from the hospital following isolated coronary artery bypass graft (CABG) surgery. The outcome is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission.

The Centers for Medicare & Medicaid Services (CMS) annually reports the measure for individuals who are 65 years and older and are Medicare Fee-for-Service (FFS) beneficiaries hospitalized in non-federal short-term acute care hospitals (including Indian Health Services hospitals) and critical access hospitals.

Rationale

As readmission following coronary artery bypass graft (CABG) is likely a signal of perioperative

complications and suboptimal transitional care, the readmission measure offers the additional benefit of illuminating areas for improvements for hospitals, in order to minimize medical and surgical complications during surgery and the postoperative period, and improving the care provided in the transition to outpatient settings. The premise is that improved quality of care, including coordination and communication among providers, patients, and their caregivers, can favorably influence performance on these measures.

High readmission rates and wide variation in these rates suggest that there is room for improvement. Reducing readmissions after CABG surgery has been identified as a target for quality measurement. An all-cause readmission measure for patients who undergo CABG surgery will provide hospitals with an incentive to reduce readmissions through prevention and/or early recognition and treatment of postoperative complications, and improved coordination of peri-operative care and discharge planning.

Evidence for Rationale

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research & Evaluation (CORE). Hospital-level 30-day all-cause unplanned readmission following coronary artery bypass graft surgery (CABG): updated measure methodology report. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2014 Jun 3. 136 p. [8 references]

Primary Health Components

Coronary artery bypass graft (CABG); 30-day readmission rate

Denominator Description

The measure cohort consists of admissions for Medicare Fee-for-Service (FFS) beneficiaries aged 65 years and older and discharged from non-federal acute care hospitals and critical access hospitals having a procedure code for a qualifying isolated coronary artery bypass graft (CABG) procedure during the index admission.

The risk-standardized readmission rate (RSRR) is calculated as the ratio of the number of "predicted" readmissions to the number of "expected" readmissions at a given hospital, multiplied by the national observed readmission rate. For each hospital, the denominator is the number of readmissions expected based on the nation's performance with that hospital's case-mix.

See the related "Denominator Inclusions/Exclusions" field.

Note: This outcome measure does not have a traditional numerator and denominator like a core process measure; thus, this field is used to define the measure cohort.

See the *2017 Procedure-specific Measures Updates and Specifications Report: Hospital-level 30-day Risk-standardized Readmission Measures* for more details.

Numerator Description

This measure assesses unplanned readmissions to an acute care hospital, from any cause, within 30 days from the date of discharge of the index coronary artery bypass graft (CABG) surgery admission.

The risk-standardized readmission rate (RSRR) is calculated as the ratio of the number of "predicted" readmissions to the number of "expected" readmissions at a given hospital, multiplied by the national observed readmission rate. For each hospital, the numerator of the ratio is the number of readmissions within 30 days predicted based on the hospital's performance with its observed case-mix.

See the related "Numerator Inclusions/Exclusions" field.

Note: This outcome measure does not have a traditional numerator and denominator like a core process measure; thus, this field is used to define the measure cohort.

See the *2017 Procedure-specific Measures Updates and Specifications Report: Hospital-level 30-day Risk-standardized Readmission Measures* for more details.

Evidence Supporting the Measure

Type of Evidence Supporting the Criterion of Quality for the Measure

One or more research studies published in a National Library of Medicine (NLM) indexed, peer-reviewed journal

Additional Information Supporting Need for the Measure

In 2007, the Medicare Payment Advisory Committee (MedPAC) published a report to Congress in which it identified the seven conditions associated with the most costly potentially preventable readmissions in the United States (U.S.). Among these seven, coronary artery bypass graft (CABG) ranked as having the highest potentially preventable readmission rate within 15 days following discharge (13.5%) as well as the second highest average Medicare payment per readmission ($8,136) (MedPAC 2007). The annual cost to Medicare for potentially preventable CABG readmissions was estimated at $151 million.

Variation in readmission rates indicates opportunity for improvement. Applying the measure to 2009 Medicare claims data; the range in hospital-level -standardized readmission rates (RSRRs) is 13.3% to 21.3%.

High readmission rates and wide variation in these rates suggest that there is room for improvement. Reducing readmissions after CABG surgery has been identified as a target for quality measurement. An all-cause readmission measure for patients who undergo CABG surgery will provide hospitals with an incentive to reduce readmissions through prevention and/or early recognition and treatment of postoperative complications, and improved coordination of peri-operative care and discharge planning. Finally, CABG surgery has been identified as a potential applicable condition for use in the Affordable Care Act's Hospital Readmission Reduction Program.

Evidence for Additional Information Supporting Need for the Measure

Medicare Payment Advisory Commission (MedPAC). Report to the Congress: promoting greater efficiency in Medicare. Washington (DC): Medicare Payment Advisory Commission (MedPAC); 2007 Jun. 277 p.

Extent of Measure Testing

Assessment of Updated Models

The coronary artery bypass graft (CABG) readmission measure estimates hospital-specific 30-day all-cause risk-standardized readmission rates (RSRRs) using a hierarchical logistic regression model. Refer to Section 2 in the original measure documentation for a summary of the measure methodology and model risk-adjustment variables. Refer to prior methodology and technical reports for further details.

The Centers for Medicare & Medicaid Services (CMS) evaluated and validated the performance of the model using July 2013 to June 2016 data for the 2017 reporting period. They also evaluated the stability of the risk-adjustment model over the three-year measurement period by examining the model variable frequencies, model coefficients, and the performance of the risk-adjustment model in each year.

CMS assessed logistic regression model performance in terms of discriminant ability for each year of data and for the three-year combined period. They computed two summary statistics to assess model performance: the predictive ability and the area under the receiver operating characteristic (ROC) curve (c-statistic). CMS also computed between-hospital variance for each year of data and for the three-year combined period. If there were no systematic differences between hospitals, the between-hospital variance would be zero.

The results of these analyses are presented in Section 4.2 of the original measure documentation.

Coronary Artery Bypass Graft (CABG) Surgery Readmission 2017 Model Results

Frequency of CABG Surgery Model Variables

CMS examined the change in the frequencies of clinical and demographic variables. Frequencies of model variables were stable over measurement period. There were no notable changes (greater than 2% absolute change) in the frequencies.

CABG Surgery Model Parameters and Performance

Table 4.2.2 in the original measure documentation shows hierarchical logistic regression model variable coefficients by individual year and for the combined three-year dataset. Table 4.2.3 in the original measure documentation shows the risk-adjusted odds ratios (ORs) and 95% confidence intervals for the CABG surgery readmission model by individual year and for the combined three-year dataset. Overall, the variable effect sizes were relatively constant across years. In addition, model performance was stable over the three-year time period; the c-statistic remained constant at 0.64.

Refer to the original measure documentation for additional information.

Evidence for Extent of Measure Testing

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research and Evaluation (CORE). 2017 procedure-specific measures updates and specifications report: hospital-level 30-day risk-standardized readmission measures. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2017 Mar. 80 p.

State of Use of the Measure

State of Use

Current routine use

Current Use

not defined yet

Application of the Measure in its Current Use

Measurement Setting

Hospital Inpatient

Professionals Involved in Delivery of Health Services

not defined yet

Least Aggregated Level of Services Delivery Addressed

Single Health Care Delivery or Public Health Organizations

Statement of Acceptable Minimum Sample Size

Does not apply to this measure

Target Population Age

Age greater than or equal to 65 years

Target Population Gender

Either male or female

National Strategy for Quality Improvement in Health Care

National Quality Strategy Priority

Institute of Medicine (IOM) National Health Care Quality Report Categories

IOM Care Need

Not within an IOM Care Need

IOM Domain

Not within an IOM Domain

Data Collection for the Measure

Case Finding Period

Discharges July 1, 2013 through June 30, 2016

Denominator Sampling Frame

Patients associated with provider

Denominator (Index) Event or Characteristic

Institutionalization

Patient/Individual (Consumer) Characteristic

Therapeutic Intervention

Denominator Time Window

not defined yet

Denominator Inclusions/Exclusions

Inclusions
An *index admission* is the hospitalization to which the readmission outcome is attributed and includes admissions for patients:

> Having a qualifying isolated coronary artery bypass graft (CABG) procedure during the index admission*
> Enrolled in Medicare Fee-for-Service (FFS) Part A and Part B for the 12 months prior to the date of admission, and enrolled in Part A during the index admission
> Aged 65 or over
> Discharged alive from a non-federal short-term acute care hospital

*Refer to the original measure documentation for International Classification of Diseases, Tenth Revision, Procedure Coding System (ICD-10-PCS) codes used to identify CABG procedures in claims for discharges on or after October 1, 2015.

Isolated CABG surgeries are defined as those procedures performed *without* the following concomitant valve or other major cardiac, vascular, or thoracic procedures. These procedure groups include:

> Valve procedures;
> Atrial and/or ventricular septal defects;
> Congenital anomalies;
> Other open cardiac procedures;
> Heart transplants;
> Aorta or other non-cardiac arterial bypass procedures;
> Head, neck, intracranial vascular procedures; and
> Other chest and thoracic procedures

Note: International Classification of Diseases, Ninth Revision (ICD-9) code lists for discharges prior to October 1, 2015 can be found in the *2016 Procedure-specific Measures Updates and Specifications Report: Hospital-Level 30-Day Risk-Standardized Readmission Measures*.

Exclusions

> Without at least 30 days of post-discharge enrollment in Medicare FFS
> Discharged against medical advice
> Admissions for subsequent qualifying CABG procedures during the measurement period

Exclusions/Exceptions

not defined yet

Numerator Inclusions/Exclusions

Inclusions
This measure assesses unplanned readmissions, from any cause, within 30 days the date of discharge

from the index coronary artery bypass graft (CABG) admission.

If a patient has more than one unplanned admission within 30 days of discharge from the index admission, only the first is considered a readmission. The measures assess a dichotomous yes or no outcome of whether each admitted patient has any unplanned readmission within 30 days. If the first readmission after discharge is planned, any subsequent unplanned readmission is not considered in the outcome for that index admission because the unplanned readmission could be related to care provided during the intervening planned readmission rather than during the index admission.

The hospital-specific risk-standardized readmission rate (RSRR) is calculated as the ratio of the number of "predicted" readmissions to the number of "expected" readmissions, multiplied by the national unadjusted readmission rate. The "numerator" of the ratio is the number of readmissions within 30 days predicted on the basis of the hospital's performance with its observed case-mix.

Note: This outcome measure does not have a traditional numerator and denominator like a core process measure; thus, this field is used to define the outcome.

See the *2017 Procedure-specific Measures Updates and Specifications Report: Hospital-level 30-day Risk-standardized Readmission Measures* for more details.

Exclusions
Admissions identified as planned by the planned readmissions algorithm are not counted as readmissions. The planned readmission algorithm is a set of criteria for classifying readmissions and planned among the general Medicare population using Medicare administrative claims data. The algorithm identified admissions that are typically planned and may occur within 30 days of discharge from the hospital.

The planned readmission algorithm has three fundamental principles:

A few specific, limited types of care are always considered planned (transplant surgery, maintenance chemotherapy/immunotherapy, rehabilitation);
Otherwise, a planned readmission is defined as a non-acute readmission for a scheduled procedure; and
Admissions for acute illness or for complications of care are never planned

The planned readmission algorithm uses a flow chart and four tables of procedures and conditions to operationalize these principles and to classify readmissions as planned. The flow chart and tables are available in the *2017 Procedure-specific Measures Updates and Specifications Report: Hospital-level 30-day Risk-standardized Readmission Measures* .

Numerator Search Strategy

Institutionalization

Data Source

Administrative clinical data

Type of Health State

Proxy for Outcome

Instruments Used and/or Associated with the Measure

Planned Readmission Algorithm Version 4.0 (ICD-10) Flowchart

Computation of the Measure

Measure Specifies Disaggregation

Does not apply to this measure

Scoring

Rate/Proportion

Interpretation of Score

Desired value is a lower score

Allowance for Patient or Population Factors

not defined yet

Description of Allowance for Patient or Population Factors

Risk-Adjustment Variables

In order to account for differences in case mix among hospitals, the measure adjusts for variables (for example, age, comorbid diseases, and indicators of patient frailty) that are clinically relevant and have relationships with the outcome. For each patient, risk-adjustment variables are obtained from inpatient, outpatient, and physician Medicare administrative claims data extending 12 months prior to, and including, the index admission.

The measure adjusts for case mix differences among hospitals based on the clinical status of the patient at the time of the index admission. Accordingly, only comorbidities that convey information about the patient at that time or in the 12 months prior, and not complications that arise during the course of the hospitalization, are included in the risk adjustment.

The measure does not adjust for socioeconomic status (SES) because the association between SES and health outcomes can be due, in part, to differences in the quality of health care that groups of patients with varying SES receive. The intent is for the measure to adjust for patient demographic and clinical characteristics while illuminating important quality differences. As part of the National Quality Forum (NQF) endorsement process for this measure, the Centers for Medicare & Medicaid Services (CMS) completed analyses for the two-year Sociodemographic Trial Period. Although univariate analyses found that the patient-level observed (unadjusted) readmission rates are higher for dual-eligible patients (for patients living in lower Agency for Healthcare Research and Quality [AHRQ] SES Index census block groups) and African-American patients compared with all other patients, analyses in the context of a multivariable model demonstrated that the effect size of these variables was small, and that the c-statistics for the models are similar with and without the addition of these variables.

Refer to Appendix D of the original measure documentation for the list of comorbidity risk-adjustment variables and the list of complications that are excluded from risk adjustment if they occur only during the index admission.

Standard of Comparison

not defined yet

Identifying Information

Original Title

Hospital-level 30-day RSRR following CABG surgery.

Measure Collection Name

National Hospital Inpatient Quality Measures

Measure Set Name

Readmission Measures

Submitter

Centers for Medicare & Medicaid Services - Federal Government Agency [U.S.]

Developer

Centers for Medicare & Medicaid Services - Federal Government Agency [U.S.]

Yale-New Haven Health Services Corporation/Center for Outcomes Research and Evaluation under contract to Centers for Medicare & Medicaid Services - Academic Affiliated Research Institute

Funding Source(s)

Centers for Medicare & Medicaid Services (CMS)

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Financial Disclosures/Other Potential Conflicts of Interest

None

Endorser

National Quality Forum - None

NQF Number

not defined yet

Date of Endorsement

2017 Jul 12

Core Quality Measures

Cardiology

Measure Initiative(s)

Hospital Compare

Hospital Inpatient Quality Reporting Program

Adaptation

This measure was not adapted from another source.

Date of Most Current Version in NQMC

2017 Mar

Measure Maintenance

Annual

Date of Next Anticipated Revision

2018 Apr

Measure Status

This is the current release of the measure.

This measure updates a previous version: Specifications manual for national hospital inpatient quality measures, version 5.0b. Centers for Medicare & Medicaid Services (CMS), The Joint Commission; Effective 2015 Oct 1. various p.

Measure Availability

Source available from the QualityNet Web site [   ].

Check the QualityNet Web site regularly for the most recent version of the specifications manual and for the applicable dates of discharge.

Companion Documents

The following are available:

Hospital compare: a quality tool provided by Medicare. [internet]. Washington (DC): U.S. Department of Health and Human Services; [accessed 2017 Oct 30]. Available from the Medicare Web site [   ].

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research and Evaluation (CORE). 2017 Medicare hospital quality chartbook. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2017. Available from the Centers for Medicare & Medicaid Services (CMS) Web site [   ].

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research and Evaluation (CORE). 2017 procedure-specific readmission measures updates and specifications report: supplemental ICD-10 code lists for use with claims for discharges on or after October 1, 2015. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2017. Available from the QualityNet Web site [   ].

NQMC Status

This NQMC summary was completed by ECRI Institute on July 21, 2015. The information was verified by

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Copyright Statement

Production

Source(s)

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research and Evaluation (CORE). 2017 procedure-specific measures updates and specifications report: hospital-level 30-day risk-standardized readmission measures. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2017 Mar. 80 p.

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